

Does Home Court Advantage Win Basketball Games?



ABSTRACT

Using two 2-tailed t-tests, we attempted to determine the existence of a home court advantage in the NBA during the regular and postseason and how accurate general consensus was about home court advantage. To do this, we sent out a preliminary survey to determine existing opinions about home court advantage. We found that the evidence overwhelmingly supports the existence of a home court advantage, and that the beliefs of the majority of the respondents we surveyed were consistent with this finding. We attribute these findings to the crowd factor, finding that a favorable crowd greatly impacts player performance and subsequently win percentage.

I. Introduction

Dating back to 1891, American basketball has always been a fundamentally team-oriented sport. Evidence suggests that team efforts and displays of work ethic have “production spillovers” in basketball, motivating other team members to perform overall(Arcidiacono et al., 2015). Crucially, this plays a factor in determining the “home-court advantage”, if believed that outside enthusiasm can positively affect individual play. Conversely, it has also been documented that among players, although instructional self-talk improved shooting accuracy and reduced variability in movement coordination, motivational self-talk had no or negligible differences in performance, though this study did not look at the effects of motivational peer talk(Abdoli et al., 2018). Thus, it may be the case that only meaningful enthusiasm, or actions that could lead to differing styles of performance, rather than increased determination, could change the course of a game, and an enthusiastic home crowd would play a minor role in team performance(Abdoli et al., 2018).

However, to solely focus on the fan based aspect of the “home-court advantage” would be to discount the many other factors at play. Proponents of “home-court advantage” also cite referee bias for home favorites. Although a analysis of 1,229 referee calls from 113 close games found little evidence for home team favoritism(Deutscher 2015), other studies have found that referee decisions can be significantly swayed by outside factors. Basketball referees have been shown to favor star players, as these players were awarded with an additional 0.32 free throw attempts per minute during the fourth quarter of NBA Playoff games(Caudill et al., 2014). This may favor such teams with higher concentrations of “star” players, but for the purposes of this study, it can be noted that overall, scientific literature points to the absence of meaningful referee

bias when determining home-court advantage(Morgulev et al. 2018). Other factors, like terrain and travel time between games, were found to be negligible factors as well(Zimmerman 2017). It may be of interest to note that English soccer players were found to have significantly higher salivary testosterone levels before home games as opposed to away games(Neave and Wolfson, 2003), but no such literature exists for US basketball, the focus of this study.

The purpose of this experiment is to determine two things. First, the experiment will determine existing public opinion regarding the existence of a “home-court advantage” and its prevalence in US NBA basketball. Second, the experiment will determine if “home-court advantage” has a significant impact on determining game outcomes. By determining these two factors, it is possible to not only understand the role of home-court advantage in boosting player performance, but also enhance psychological literature regarding discrepancies between generally held beliefs about a common phenomenon, and the practical impact of the phenomenon.

II. Materials and Methods

A team's win percentage is divided into two parts: home wins and away wins. Even if the team was bad and didn't win very much, they will have a certain number of wins at home vs. away. Were more of those wins at home or away? Our experiment is divided between a survey and a study, to determine conventional beliefs surrounding home court advantage, and the reality of a home court advantage, respectively.

To see what people think home court advantage, we created a survey and gathered around 80 responses to it. The survey will consist of 5 statements: I play basketball regularly, I watch collegiate basketball regularly, I watch professional basketball regularly, home court advantage affects player performance, and home court advantage can alter the outcome of a basketball game. The participants will have 5 answers to each statement: strongly agree, agree, indifferent, disagree, and strongly disagree. These questions gauge several things from the audience. First, we see what kind of knowledge the person has of basketball. This allows us to see if experienced and non-experienced basketball players think differently. Next, it asks the information we need, which is how strong home court advantage is. For our survey, we only chose to use the opinions of those who agreed or agreed that they watch professional basketball regularly, and a majority of those respondents said that they slight agree or agree with the statement "I play basketball regularly."

Secondly, we studied data from the past 16 seasons of basketball in the NBA to see how home court advantage affects the outcome of a game. To make sure we were looking at evenly matched games where home court advantage would be the deciding factor, we focused on teams that were evenly seeded in the playoffs. The most evenly ranked games are those between the 4 and 5 seed in the first round of every playoffs. So, we found the 4 and 5 seed for every one of the last 16 seasons and researched the following information for each team: home wins during the regular season, away wins during the regular season, home wins during the 1st round of playoffs, how many home games did they play in the 1st round, away wins during the 1st round of playoffs, how many away games did they play in the first round.

This information tells us several key things that will allow us to gauge the impact of home court advantage. First we see how many games the team won at home versus away during the regular season. There are 41 home and 41 away games, so we put the number won over the number total. Both of these numbers will be a fraction, easily converted to a percentage. We can then compare the percentages to see the difference. The method for the playoffs is very similar, but slightly different. There are not a set number of home and away games during the playoffs, as it is a best of 7 series. It could take 4 games at the shortest, or 7 at the longest. We manually counted how many home wins the teams had over home games played, and the same for away games, again giving us a fraction, which we converted to percentages.

Finally, we cross referenced our sources from basketball-reference.com to the official NBA website, and if necessary, to individual team websites. This gave us confirmation that there were no data errors.

III. Results:

After collecting data from the NBA as well as people's perception on home court advantage, we were able to calculate how accurately people perceived home court advantage. As shown in figure 1, on average teams who play at home win around 69.6%, while on average teams who play away win around 50.2%. Eighty people took our survey and on average they responded in between indifferent and agree, and if we were to quantify that data it comes out to be 66.5%. Table 1 shows the win rates of the 4th and 5th seeded teams from the NBA dating back to 2002, both at home and away. Table 2 depicts the survey results used, namely do respondents believe that home court advantage exists. Figure 1 shows a comparison between average home court and away win rate comparisons in the regular season (for the 4th and 5th ranked seeds we compared), while Figure 2 shows the same for post season win percentages. Figure 3 shows how much respondents felt that home court advantage played a role in determining the outcome of a game, with weights 0% for strongly disagree, 25% for disagree, 50% for neutral, 75% for agree, and 100% for strongly agree. Performing a two tailed t-test for the difference between regular season win rates at home and away, we found a p-value of less than 10^{-10} . Performing a two tailed t-test for the difference between post season win rates at home and away, we found a p-value of less than 10^{-6} .

TABLE 1: Analysis of 4th and 5th seeded NBA teams in Western and Eastern conference

2002-2019

<u>Year</u>	<u>Conference</u>	<u>Seed</u> <u>(ranking)</u>	<u>Regular Season</u>		<u>Post Season (We are only collecting data for the first round)</u>			
			<u>Home</u>	<u>Away Win</u>	<u>Home</u>	<u>Games</u>	<u>Away Win</u>	<u>Games played</u>
			<u>Win</u>		<u>Win</u>	<u>played</u>		
<u>2018-2019</u>	<u>West</u>	4	31	22	3	3	1	2
		5	29	21	1	2	0	3
	<u>East</u>	4	28	21	2	2	2	2
		5	29	19	0	2	0	2
<u>2017-2018</u>	<u>West</u>	4	27	21	2	3	0	3
		5	28	20	3	3	1	3
	<u>East</u>	4	29	21	3	4	1	3
		5	27	21	2	3	1	4
<u>2016-2017</u>	<u>West</u>	4	29	22	1	4	2	3
		5	29	22	1	3	3	4
	<u>East</u>	4	30	19	3	3	1	3
		5	23	20	2	3	0	3
<u>2015-2016</u>	<u>West</u>	4	29	24	2	3	0	3
		5	28	16	3	3	1	3
	<u>East</u>	4	27	21	3	3	1	3

		5	28	20	2	3	0	3
<u>2014-2015</u>	<u>West</u>	4	32	19	1	2	0	3
		5	31	24	3	3	1	2
	<u>East</u>	4	27	22	0	2	0	2
		5	29	17	2	2	2	2
<u>2013-2014</u>	<u>West</u>	4	33	21	1	3	1	3
		5	32	23	2	3	2	3
	<u>East</u>	4	29	21	0	3	1	2
		5	22	22	1	2	3	3
<u>2012-2013</u>	<u>West</u>	4	32	24	2	3	0	3
		5	32	25	3	3	1	3
	<u>East</u>	4	26	23	2	4	1	3
		5	24	21	2	3	2	4
<u>2011-2012</u>	<u>West</u>	4	26	15	2	3	1	3
		5	24	16	2	3	2	4
	<u>East</u>	4	23	16	3	3	1	2
		5	24	17	2	3	0	3
<u>2010-2011</u>	<u>West</u>	4	30	25	3	3	1	2
		5	33	27	1	2	0	3
	<u>East</u>	4	29	22	2	3	0	3
		5	24	20	3	3	1	3
<u>2009-2010</u>	<u>West</u>	4	34	19	2	3	0	3

		5	32	21	1	3	3	3
	<u>East</u>	4	24	26	3	3	1	2
		5	24	23	1	2	0	3
<u>2008-2009</u>	<u>West</u>	4	34	20	2	3	0	3
		5	33	20	3	3	1	3
	<u>East</u>	4	31	16	3	4	1	3
		5	27	16	2	3	1	4
<u>2007-2008</u>	<u>West</u>	4	37	17	2	3	2	3
		5	31	24	1	3	1	3
	<u>East</u>	4	24	21	2	3	2	3
		5	25	18	1	3	1	3
<u>2006-2007</u>	<u>West</u>	4	31	20	3	3	1	4
		5	28	24	3	4	0	3
	<u>East</u>	4	27	17	0	2	0	2
		5	31	18	2	2	2	2
<u>2005-2006</u>	<u>West</u>	4	34	26	2	2	2	2
		5	20	29	0	2	0	2
	<u>East</u>	4	31	19	2	3	2	3
		5	27	15	1	3	1	3
<u>2004-2005</u>	<u>West</u>	4	29	29	2	4	2	3
		5	26	25	1	3	2	4
	<u>East</u>	4	27	20	2	3	0	3

		5	29	16	3	3	1	3
<u>2003-2004</u>	<u>West</u>	4	34	21	3	3	1	2
		5	27	18	1	2	0	3
	<u>East</u>	4	29	19	4	4	0	3
		5	25	16	3	3	0	4
<u>2002-2003</u>	<u>West</u>	4	33	18	1	3	1	3
		5	31	19	2	3	2	3
	<u>East</u>	4	25	23	2	3	2	3
		5	28	19	1	3	1	3

TABLE 2: Survey results of Home Court Advantage

Survey Results					
Home court advantage can alter the outcome of a basketball game					
0%	25%	50%	75%	100%	
Strongly disagree	disagree	indifferent	agree	strongly agree	# of Responses
1	4	7	40	28	80

FIGURE 1: Home Court vs Away Regular Season Win Percentages

Win Percentage during the Regular Season

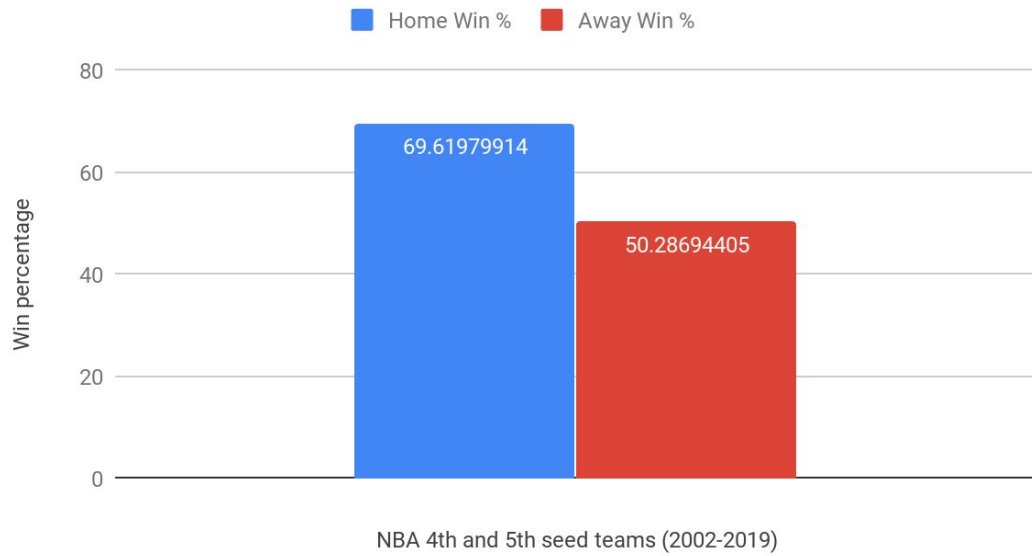


FIGURE 2: Home Court vs Away Postseason Win Percentages

Win Percentage during the First round of the Playoffs

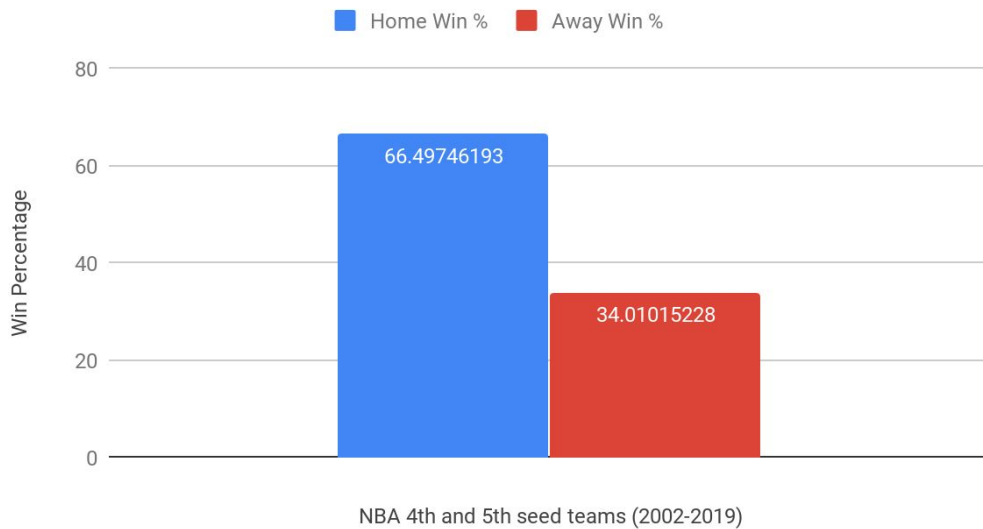
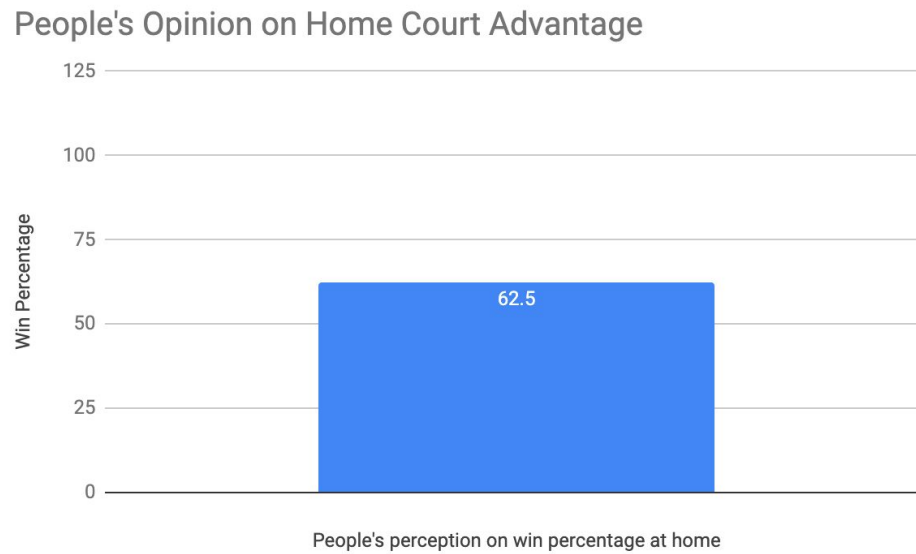


FIGURE 3: Survey Opinions on Home Court Advantage



IV. Discussion

Since the P-value for both regular and postseason win rates in the NBA are less than .05, we reject the null hypothesis, and find there is a difference between home and away win rates in the NBA. We hypothesize this is true because of the “production spillovers”(Arcidiacono et al., 2015), that occur when teammates sense enthusiasm from their atmosphere, disseminating to create more efficient plays. This conclusion is supported by another study that found home court crowds offer more recognition to home players, best allowing them to live up to their full potential (Yi 2017). We had initially discounted the conclusions of this study, as it pertained to college basketball, and we theorized that NBA players had become accustomed to home crowd favoritism and were therefore more likely to perform towards their norm. Clearly, we have shown that the impacts of home court advantage are far reaching beyond years or even decades of adjustment. Furthermore, the study discounted the familiarity of the home court, and isolate the home crowd as the main contributing factor to performance enhancement (Yi 2017).

Conversely, it has been shown that when players are jeered for performance, irregardless of their performance, would negatively affect player performance across the board (Greer 1983). Thus, this factor is so impactful, other factors, like terrain, travel time, and referee bias, are negligible when determining win percentage. This conclusion is supported by current literature, which discounts referee bias in NBA games (Deutscher 2015), as well as travel time and terrain (Zimmerman 2017). We found home court advantage did not disappear in critical win-lose situations, like the NBA playoffs, disagreeing with literature that home court advantage may apply negative pressure to perform under high-stake situations(Butler and Baumeister 1998), and again noting the pervasive and consistent effect of a favorable home crowd. We must note that

because our study qualifies home court advantage in relatively *equal* situations, this study cannot find the ability of home court advantage to overcome actual skill disparities. We also cannot extend this research to other sports, or even other American sports which may not place as much of an emphasis on teamwork as basketball. We do note that our results are consistent with similar effects in US college basketball (Yi 2017). The constraints of our timeline and our resources limits our ability to solely place responsibility for the home court advantage. If this experiment were repeated in the future with more resources and time, we would like to isolate and replicate a home court scenario over many trials, to gauge the true impact of a home crowd in game performance.

V.Works Cited

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